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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/787,120	02/27/2004	Koichiro Tanaka	0756-7259	4693

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EXAMINER	
LUU, CHUONG A	

ART UNIT	PAPER NUMBER
2818	

DATE MAILED: 12/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/787,120	TANAKA ET AL.	
	Examiner	Art Unit	
	Chuong A. Luu	2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/5/04; 2/22; 3/3/; 7/6/05*
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group I, claims 7-17 in the reply filed on September 29, 2005 is acknowledged.

PRIOR ART REJECTIONS

Statutory Basis

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The Rejections

Claims 7-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Sato et al. (U.S. 5,304,357).

Sato discloses an apparatus for zone melting a thin semiconductor film with

(7); (8) shaping a first laser beam having a wavelength not longer than that of visible

light into an elongated beam on a surface to be irradiated;

irradiating the surface with the elongated beam wherein an irradiation area of the elongated beam has at least a first portion and a second portion, said first portion having a lower energy density than the second portion;

irradiating the surface with a second laser beam concurrently with the elongated beam in such a manner that an irradiation area of the second laser beam overlaps at least the first portion of the irradiation area of the elongated beam while moving the surface relatively to the elongated beam and the second laser beam in a first direction (see column 7, lines 24-67; column 8, lines 1-67 and column 9, lines 1-48. Figure 17);

(9) wherein each of the first laser beam and the second laser beam is emitted from a laser selected from the group consisting of a continuous wave gas laser, a continuous wave solid laser, and a continuous wave metal laser (see column 8, lines 42-65);

(10) wherein each of the first laser beam and the second laser beam is emitted from an Ar laser, a Kr laser, a CO_2 laser, a YAG laser, a $YV0_4$ laser, a YLF laser, a $YAlO_3$ laser, an alexandrite laser, a Ti: Sapphire laser, and a helium-cadmium laser (see column 8, lines 42-65);

(11) wherein the surface to be irradiated is a film formed over a substrate transparent to the first laser beam having a thickness d, and wherein an incidence angle Ø of the first laser beam to the surface to be irradiated satisfies an inequality $Ø \geq \arctan(W/2d)$, when a major axis of the elongated beam or a minor axis of the elongated beam is assumed to have a length of W (see Figures 17 and 20);

(12); (13) forming a non-single crystalline semiconductor film over a substrate;

shaping a first laser beam emitted from a first laser oscillator into an elongated beam on a surface to be irradiated wherein the first laser beam has a wavelength not longer than that of visible light;

irradiating the non-single crystalline semiconductor film with the elongated beam wherein an irradiation area of the elongated beam has at least a first portion and a second portion, said first portion having a lower energy density than the second portion;

irradiating the non-single crystalline semiconductor film with a second laser beam emitted from a second laser oscillator, said second laser beam having a fundamental wave wherein the irradiation of the second laser beam is performed concurrently with the irradiation of the elongated beam in such a manner that an irradiation area of the second laser beam overlaps at least the first portion of the irradiation area of the elongated beam;

moving the substrate relatively to the elongated beam and the second laser beam in a first direction, thereby, forming a crystal grain region in the non-single crystalline semiconductor film;

moving the substrate in a second direction relatively to the elongated beam and the second laser beam (see column 7, lines 24-67; column 8, lines 1-67 and column 9, lines 1-48. Figure 17);

(14) wherein each of the first laser oscillator and the second laser oscillator is selected from the group consisting of a continuous wave gas laser, a continuous wave solid laser, and a continuous wave metal laser (see column 8, lines 42-65);

(15) wherein each of the first laser oscillator and the second laser oscillator is selected from the group consisting of an Ar laser, a Kr laser, a CO2 laser, a YAG laser, a YV04 laser, a YLF laser, a YAIO: laser, an alexandrite laser, a Ti: Sapphire laser, and a helium-cadmium laser (see column 8, lines 42-65);

(16) wherein the first direction and the second direction are orthogonal to each other (see Figures 17 & 20);

(17) wherein the substrate is transparent to the first laser beam and has a thickness d, and wherein an incidence angle Ø of the first laser beam to the surface to be irradiated satisfies an inequality Ø ≥arctan (W/2d), when a major axis of the elongated beam or a minor axis of the elongated beam is assumed to have a length of W (see Figures 17 & 20).

Claims 7-9 and 12-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamazaki et al. (U.S. 6,423,585 B1).

Yamazaki discloses a heat treatment device with

(7); (8) shaping a first laser beam having a wavelength not longer than that of visible light into an elongated beam on a surface to be irradiated;

irradiating the surface with the elongated beam wherein an irradiation area of the elongated beam has at least a first portion and a second portion, said first portion having a lower energy density than the second portion;

irradiating the surface with a second laser beam concurrently with the elongated

beam in such a manner that an irradiation area of the second laser beam overlaps at least the first portion of the irradiation area of the elongated beam while moving the surface relatively to the elongated beam and the second laser beam in a first direction (see column 5, lines 54-67; column 6, lines 1-67 and column 7, lines 1-48. Figures 3-4);

(9) wherein each of the first laser beam and the second laser beam is emitted from a laser selected from the group consisting of a continuous wave gas laser, a continuous wave solid laser, and a continuous wave metal laser (see column 16, lines 1-26);

(12); (13) forming a non-single crystalline semiconductor film over a substrate;

shaping a first laser beam emitted from a first laser oscillator into an elongated beam on a surface to be irradiated wherein the first laser beam has a wavelength not longer than that of visible light;

irradiating the non-single crystalline semiconductor film with the elongated beam wherein an irradiation area of the elongated beam has at least a first portion and a second portion, said first portion having a lower energy density than the second portion;

irradiating the non-single crystalline semiconductor film with a second laser beam emitted from a second laser oscillator, said second laser beam having a fundamental wave wherein the irradiation of the second laser beam is performed concurrently with the irradiation of the elongated beam in such a manner that an irradiation area of the second laser beam overlaps at least the first portion of the irradiation area of the elongated beam;

moving the substrate relatively to the elongated beam and the second laser

beam in a first direction, thereby, forming a crystal grain region in the non-single crystalline semiconductor film;

moving the substrate in a second direction relatively to the elongated beam and the second laser beam (see column 5, lines 54-67; column 6, lines 1-67 and column 7, lines 1-48. Figures 3-4);

(14) wherein each of the first laser oscillator and the second laser oscillator is selected from the group consisting of a continuous wave gas laser, a continuous wave solid laser, and a continuous wave metal laser (see column 16, lines 1-26).

PRIOR ART REJECTIONS

Statutory Basis

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The Rejections

Claim*** rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al. (U.S. 6,423,585 B1) in view of Sato et al. (U.S. 5,304,357).

Yamazaki teaches the above outlined features except for wherein each of the first laser beam and the second laser beam is emitted from an Ar laser, a Kr laser, a

CO_2 laser, a YAG laser, a YVO_4 laser, a YLF laser, a $YAlO_3$ laser, an alexandrite laser, a Ti: Sapphire laser, and a helium-cadmium laser; wherein the surface to be irradiated is a film formed over a substrate transparent to the first laser beam having a thickness d, and wherein an incidence angle Ø of the first laser beam to the surface to be irradiated satisfies an inequality Ø ≥arctan (W/2d), when a major axis of the elongated beam or a minor axis of the elongated beam is assumed to have a length of W. However, Sato discloses an apparatus for zone melting a thin semiconductor film with **(10)** wherein each of the first laser beam and the second laser beam is emitted from an Ar laser, a Kr laser, a CO_2 laser, a YAG laser, a YVO_4 laser, a YLF laser, a $YAlO_3$ laser, an alexandrite laser, a Ti: Sapphire laser, and a helium-cadmium laser (see column 8, lines 42-65); **(11)** wherein the surface to be irradiated is a film formed over a substrate transparent to the first laser beam having a thickness d, and wherein an incidence angle Ø of the first laser beam to the surface to be irradiated satisfies an inequality Ø ≥arctan (W/2d), when a major axis of the elongated beam or a minor axis of the elongated beam is assumed to have a length of W (see Figures 17 and 20); **(15)** wherein each of the first laser oscillator and the second laser oscillator is selected from the group consisting of an Ar laser, a Kr laser, a CO2 laser, a YAG laser, a YV04 laser, a YLF laser, a YAIO: laser, an alexandrite laser, a Ti: Sapphire laser, and a helium-cadmium laser (see column 8, lines 42-65); **(16)** wherein the first direction and the second direction are orthogonal to each other (see Figures 17 & 20); **(17)** wherein the substrate is transparent to the first laser beam and has a thickness d, and wherein an incidence angle Ø of the first laser beam to the surface to be irradiated satisfies an inequality Ø

≥arctan (W/2d), when a major axis of the elongated beam or a minor axis of the elongated beam is assumed to have a length of W (see Figures 17 & 20). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teaching of Yamazaki (in accordance with the teaching Sato). Doing so would facilitate the manufacture of the semiconductor device and improve the continuous uniformity of crystallization structure of the semiconductor device.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chuong A. Luu whose telephone number is (571) 272-1902. The examiner can normally be reached on M-F (6:15-2:45).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chuong Anh Luu
Patent Examiner
November 7, 2005